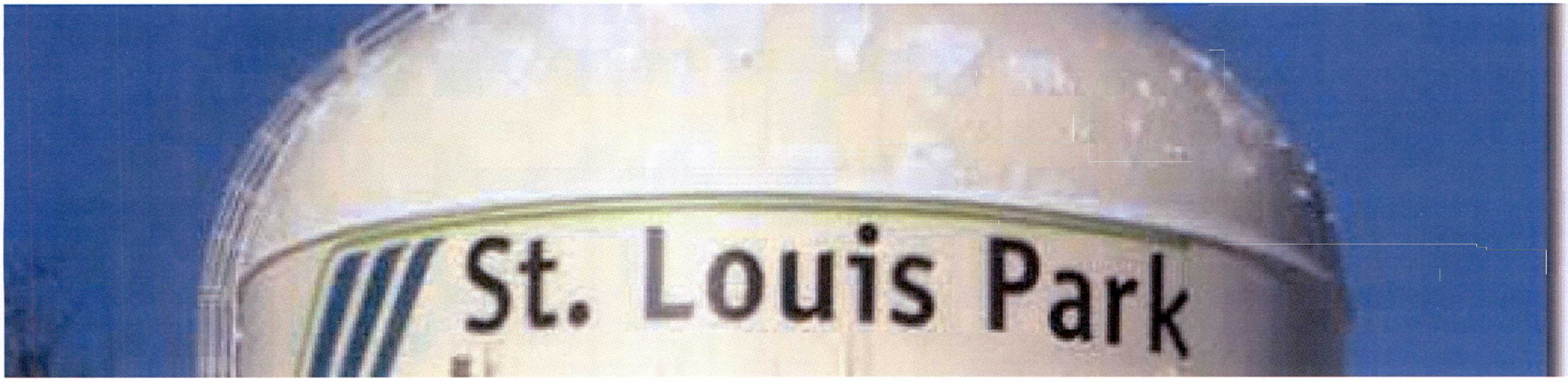


CONTAMINANT SOURCE TRACING

EDINA AND SLP GROUNDWATER CONTAMINATION
A PRELIMINARY REPORT

USEPA REGION 5 MEETING

NOVEMBER 29, 2018

RAMBOLL

THE ISSUE – ST LOUIS PARK AND EDINA GROUNDWATER

Contaminants detected/treated in municipal Prairie du Chien supply wells (250-500 ft bgs):

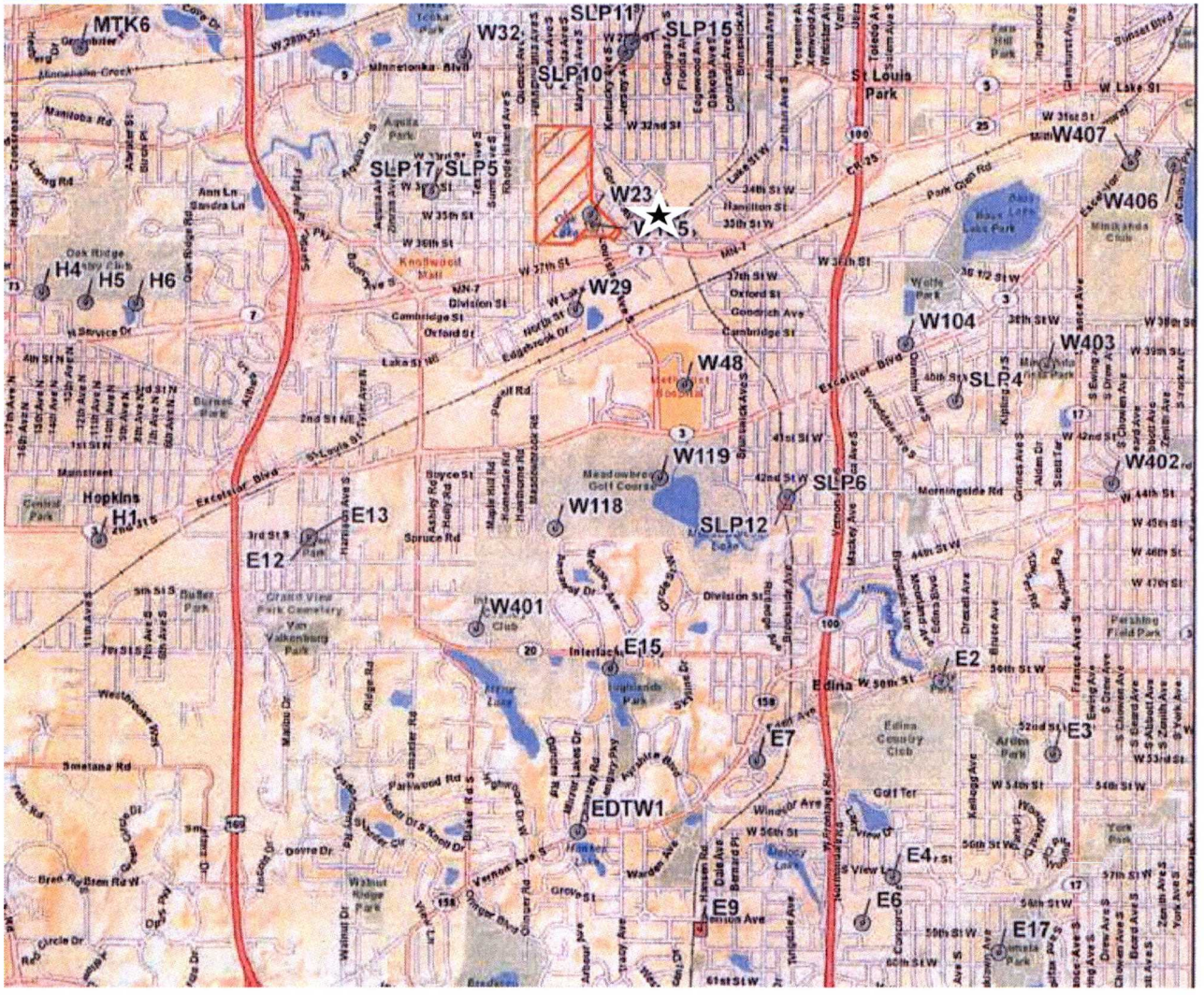
- PAHs
- Vinyl chloride
- 1,4-Dioxane (requires advanced oxidation process) – associated with chlorinated ethanes

- MPCA asserts that a plume exists and they have shown where it originates
- MPCA explicitly identifies the business known as Super Radiator Coils
- This preliminary report addresses whether the MPCA hypothesis is correct
- This preliminary report identifies far more likely sources of the municipal water contamination

Other sources.

RAMBOLL

WELL FIELD MAP



RAMBOLL

MPCA'S STATEMENTS ON THE SOURCE OF VINYL CHLORIDE IN E7

"How the source of Edina groundwater contamination was traced to St. Louis Park"

"MPCA staff collected and analyzed samples from monitoring wells, industrial wells, irrigation wells and other municipal wells located in the western Twin Cities metro area. The results showed a "VOC trail" that allowed the MPCA to trace the contamination back 2.3 miles, to the Highway 7 and Wooddale Avenue area in St. Louis Park."

Further:

"The PCE/TCE groundwater contaminant plume appears to originate near the intersection of Walker St. and Lake St. The extent of the contaminant plume is not fully defined at this time."

https://www.pca.state.mn.us/waste/st-louis-park-solvent-plume-and-vapor-intrusion-site

6714 Walker St is located at the corner of Walker St and Lake St

Where is the documentation and demonstration of this "VOC trail"?

MPCA'S SITE INSPECTION REPORT (P. 5) CLAIMS A NEXUS

2.1 Source Areas

This section provides an overview of cVOC sources of the SLP Solvent Plume site. As indicated in the Preliminary Assessment (MPCA, 2016a), environmental investigation work was initiated in 2004, when VC was detected in Edina municipal well E7. Several multi-phase investigations conducted between 2004 and 2013 documented the presence of a large cVOC plume spreading from the Quaternary aquifer through the Platteville (OPVL) into the St. Peter (OSTP) and Prairie du Chien-Jordan aquifers. These sampling efforts indicate the main source is located in an area within the city of St. Louis Park in an area near the intersection of West Lake Street and Walker Street (Figure 4). PCE releases in this area have been documented at a former heat transfer equipment manufacturing facility (6714 Walker Street), a former tube fabrication facility (3356 Gorham Avenue), a former light fixture

However, this document does not attempt to demonstrate the claimed nexus with maps of groundwater levels for each aquifer indicating direction of groundwater flow, or contaminant concentrations in successive aquifers showing the natural downward migration pattern. These are standard figures for a Site Investigation Report, particularly for a complex site. The report simply refers to the presence of a bedrock valley, where the Prairie du Chien is "moderately susceptible" to contamination.

In fact, the St. Peter sandstone is ***the least*** contaminated of all aquifers between the surface and the Prairie du Chien, which does not suggest a natural vertical contaminant migration path from the surface.

ST PETER SANDSTONE DATA FROM THE SI REPORT

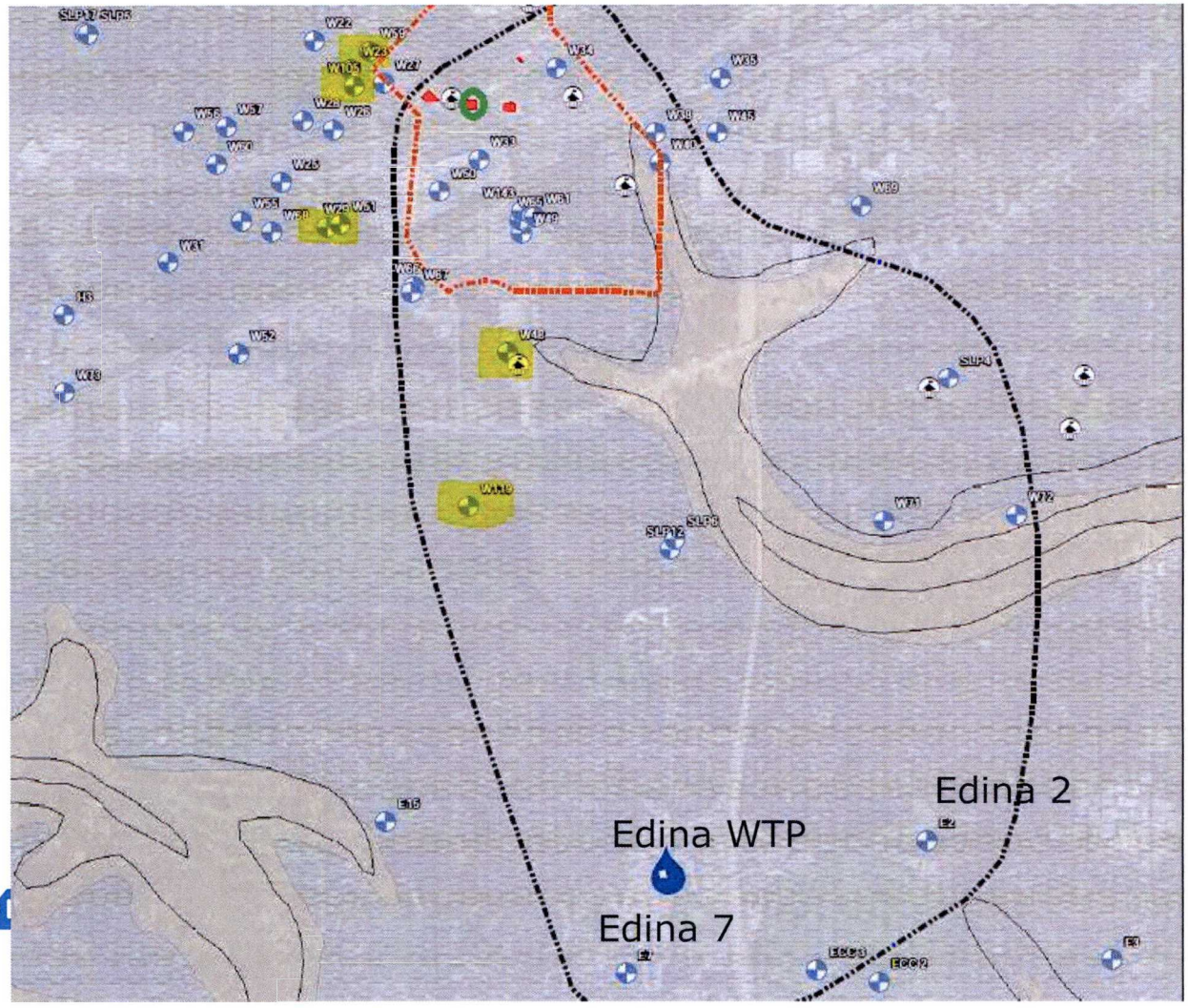
Drift Drift Drift St Peter

Sample Location (Scribe Sample ID)		P307 (ZZ-0046)			P309 (ZZ-0047)			P310 (ZZ-0048)			W133 (ZZ-0026)		
Sample Date		6/27/2016			6/27/2016			6/27/2016			6/27/2016		
AS NUMBE	ANALYTE	FINAL RESULT (ug/L)	QUALIFIER	DATA VALIDATION LABEL	FINAL RESULT (ug/L)	QUALIFIER	DATA VALIDATION LABEL	FINAL RESULT (ug/L)	QUALIFIER	DATA VALIDATION LABEL	FINAL RESULT (ug/L)	QUALIFIER	DATA VALIDATION LABEL
75-71-8	Dichlorodifluoromethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
74-87-3	Chloromethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
75-01-4	Vinyl chloride	460		S3VE	390		S3VE	91		S3VE	0.50	U	S3VE
74-83-9	Bromomethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
75-00-3	Chloroethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
75-69-4	Trichlorofluoromethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
75-35-4	1,1-Dichloroethene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
67-64-1	Acetone	10	U	S3VE	10	U	S3VE	20	U	S3VE	5.0	U	S3VE
75-15-0	Carbon disulfide	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
79-20-9	Methyl acetate	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
75-09-2	Methylene chloride	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
156-60-5	trans-1,2-Dichloroethene	120		S3VE	43		S3VE	36		S3VE	0.50	U	S3VE
1634-04-4	Methyl tert-butyl ether	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
75-34-3	1,1-Dichloroethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
156-59-2	cis-1,2-Dichloroethene	5000		S3VE	990		S3VE	2300		S3VE	0.50	U	S3VE
78-93-3	2-Butanone	10	U	S3VE	10	U	S3VE	20	U	S3VE	5.0	U	S3VE
74-97-5	Bromochloromethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
67-66-3	Chloroform	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
71-55-6	1,1,1-Trichloroethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
110-82-7	Cyclohexane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
56-23-5	Carbon tetrachloride	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
71-43-2	Benzene	22		S3VE	38		S3VE	8.7	J	S3VE	0.50	U	S3VE
107-06-2	1,2-Dichloroethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
79-01-6	Trichloroethene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
108-87-2	Methylcyclohexane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
78-87-5	1,2-Dichloropropene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
75-27-4	Bromodichloromethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
10061-01-5	cis-1,3-Dichloropropene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
108-10-1	4-Methyl-2-pentanone	10	U	S3VE	10	U	S3VE	20	U	S3VE	5.0	U	S3VE
108-88-3	Toluene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	4.2		S3VE
10061-02-6	trans-1,3-Dichloropropene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
79-00-5	1,1,2-Trichloroethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
127-18-4	Tetrachloroethene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
591-78-6	2-Hexanone	10	U	S3VE	10	U	S3VE	20	U	S3VE	5.0	U	S3VE
124-48-1	Dibromochloromethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
106-93-4	1,2-Dibromoethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
108-90-7	Chlorobenzene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
100-41-4	Ethylbenzene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
95-47-6	o-Xylene	5.0	U	S3VE	7.5		S3VE	10	U	S3VE	0.50	U	S3VE
179601-23-	m,p-Xylene	5.0	U	S3VE	3.5	J	S3VE	10	U	S3VE	0.50	U	S3VE
100-42-5	Styrene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
75-25-2	Bromoform	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
98-82-8	Isopropylbenzene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
541-73-1	1,3-Dichlorobenzene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
106-46-7	1,4-Dichlorobenzene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
95-50-1	1,2-Dichlorobenzene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
120-82-1	1,2,4-Trichlorobenzene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE
87-61-6	1,2,3-Trichlorobenzene	5.0	U	S3VE	5.0	U	S3VE	10	U	S3VE	0.50	U	S3VE

Presented data are ND for chlorinated solvents in the St Peter

This does not show a vertical migration pathway through the St Peter

BEDROCK VALLEY CONNECTION?

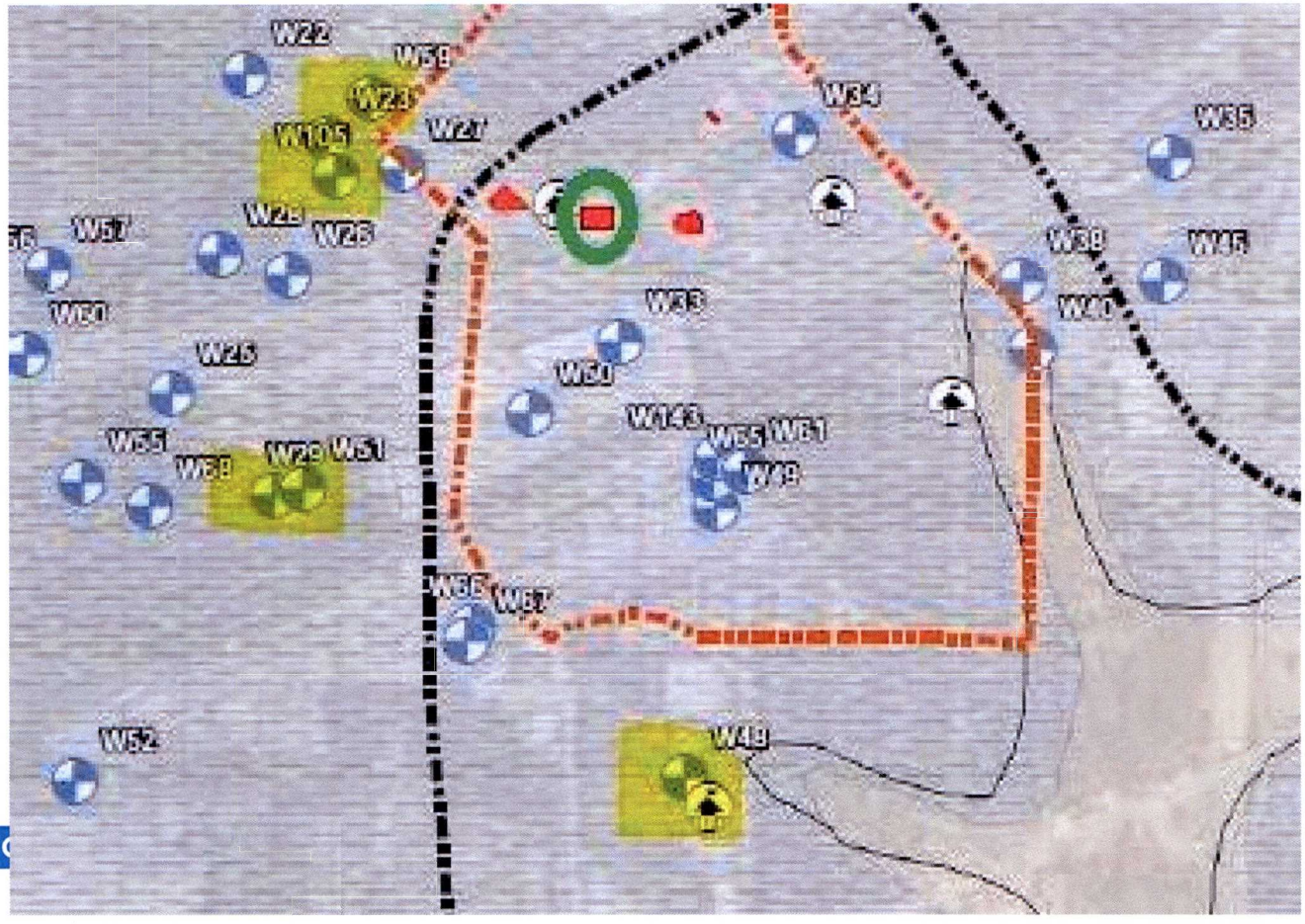


Yellow highlighted wells are Prairie du Chien wells or deeper wells with vinyl chloride > MCL (2 ug/L)

The Prairie du Chien was contaminated outside of and upgradient from the bedrock valley

Image from MPCA Site Inspection Report, Feb 2017

SI FIGURE 5 – "PLUME" EXCLUDES KNOWN DEEP CONTAMINATION



Dashed black line is labeled "Approximate Location of Solvent Plume (includes shallow and deep aquifers)"

REILLY TAR (RED) AND 6714 WALKER ST (CIRCLED)

Figure from MPCA 2015 Preliminary Assessment Report

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REILLY TAR

- Operated 1917 – 1972
- Coal tar distillation and wood treating
- W23 deep disposal well, 909 feet deep, open to Prairie du Chien
- COCs are polyaromatic hydrocarbons (PAHs), phenols, naphthalene, and BTEX
- But, Chlorinated VOCs (CVOCs) also detected in source well W23 (Prairie du Chien extraction well – expect 10-100 fold dilution as such)
  - ~ 100 ppb of cisDCE
  - ~ 10 ppb of VC
- And, in Reilly well W-105 (Ironton Galesville – below Prairie du Chien)
  - ~ 100 ppb of cisDCE
  - ~ 100 ppb of VC – highest concentration of VC in Prairie du Chien or below

REILLY TAR REMEDY

- 1986 Consent decree Remedial Action Plan
  - Groundwater treatment (GAC for PAH) at point of distribution (SLP10, SLP15, and SLP4)
  - Groundwater gradient control system in drift/Platteville, St. Peter Sandstone, and Prairie du Chien

- The gradient control wells are located south and southeast of the Reilly Tar Site
- Due to its proximity to the former Reilly Tar Site, 6714 Walker St also falls in the gradient control area for protection of the Prairie du Chien (not necessarily for the drift)

- Reilly Tar investigation provided valuable information regarding the regional hydrogeology and a groundwater model was developed to aid in the response

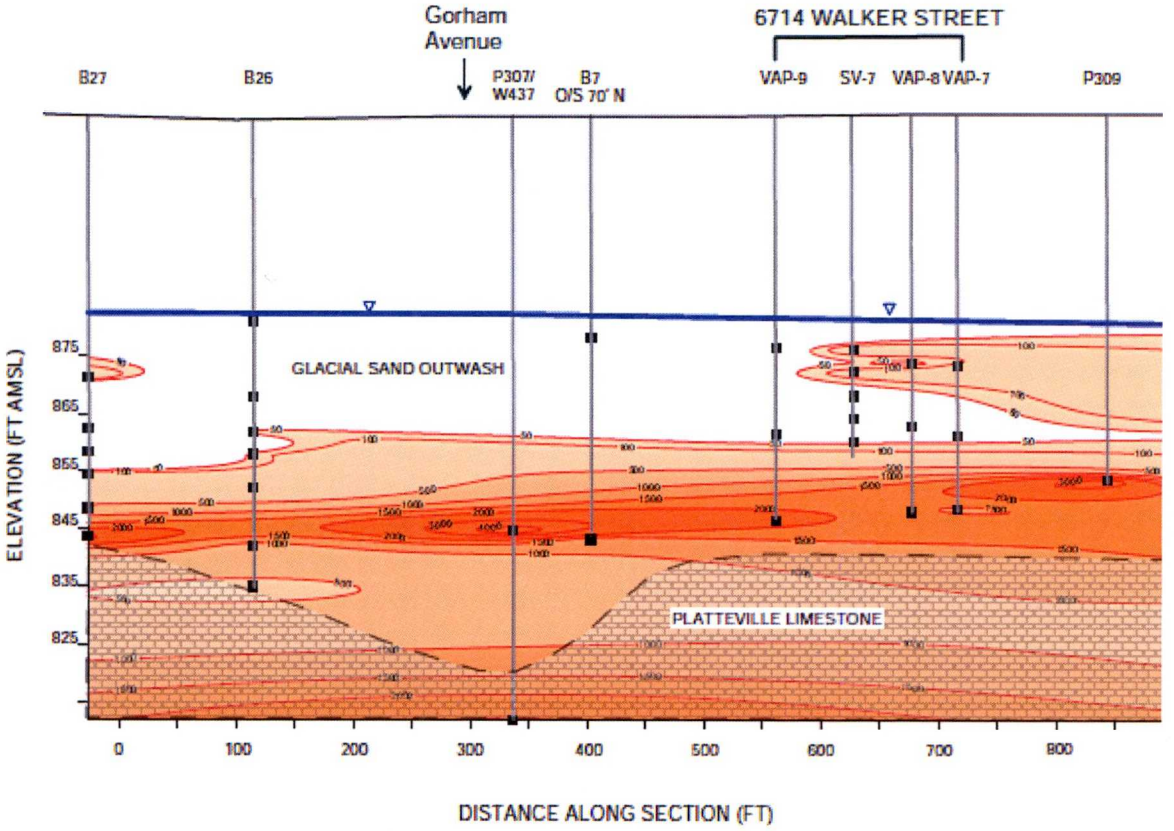
EXPANDED REILLY TAR SITE/MEADOWBROOK GROUNDWATER MODEL EXPANSION – STS, JUNE 2006

Conclusion: Trace particles released in the drift aquifer just east of the Reilly Tar Site are captured in the Reilly Tar gradient control network or travel east outside the model area, and do not travel to Edina 7

Particle path maps indicate Edina 7 captures particles impinging from the west.

CURRENT DATA FOR 6714 WALKER ST AND REGIONAL CONTAMINATION

- PCE release at 6714 Walker St to the drift aquifer, downgradient wells show impact in upper drift, not deeper
- No demonstrated vertical pathway for migration to the Prairie du Chien, no modelled pathway to Edina
- Significant upgradient contamination in the deeper Platteville, Prairie du Chien and Ironton-Galesville aquifers with clear vertical migration pathway (multi-aquifer wells)
- Multiple additional sources of chlorinated solvents (including ethanes) in the area due to significant historical industrial use



LEGEND

DCE PLUME (>50 µg/L)

SAMPLE LOCATION

GHD

6714 WALKER STREET
ST. LOUIS PARK, MN

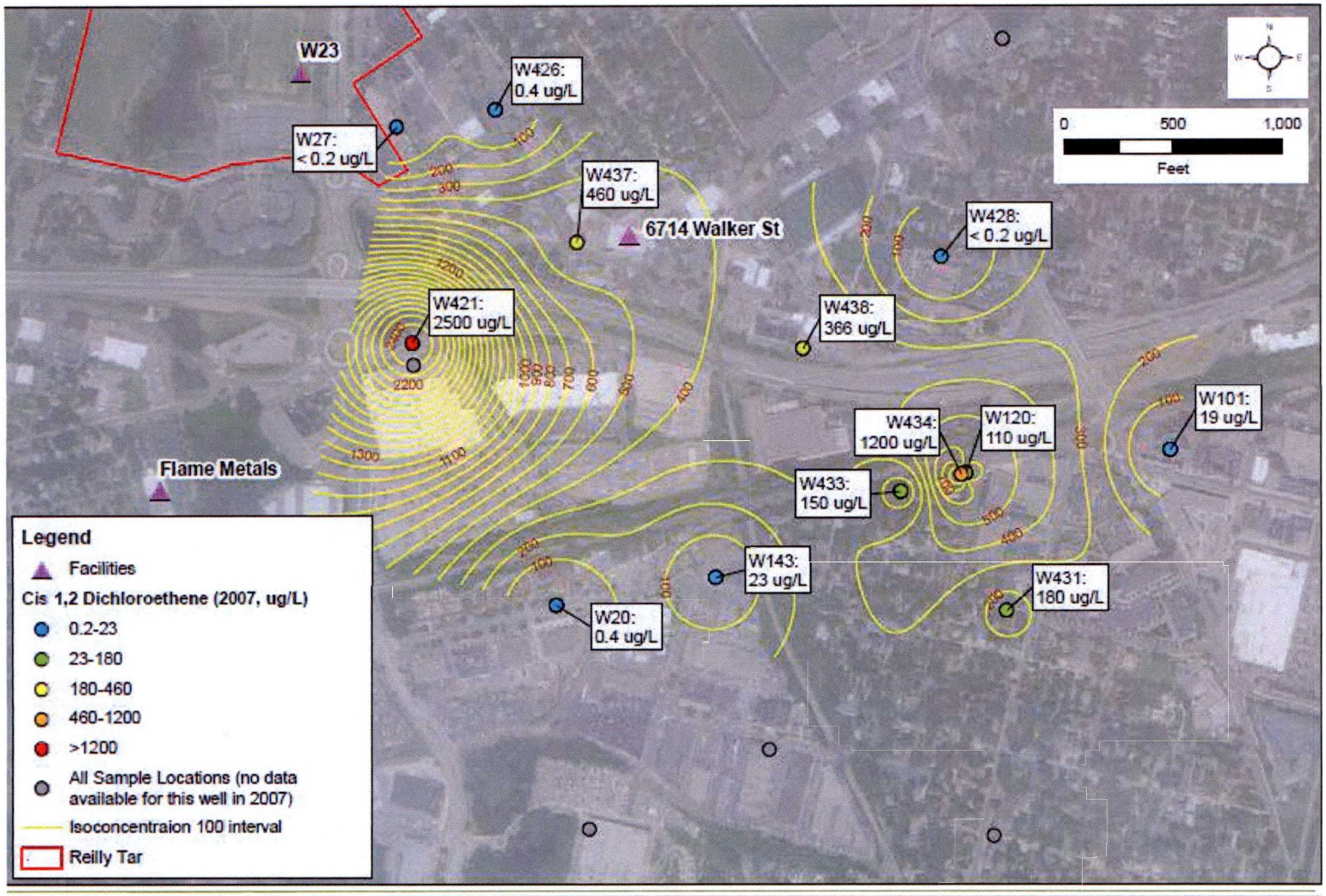
GENERALIZED CVOC PLUME
CROSS-SECTION ALONG WALKER STREET

088751
February 01, 2018

FIGURE 27

MPCA MAY BE FOCUSED ON CVOCS IN PLATTEVILLE W437

- Platteville well W437 just west (upgradient) of 6714 Walker St contains high concentrations of chlorinated solvents (PCE, then cisDCE and VC)
- Platteville well W437 also contains the following compounds:
  - BTEX
  - Naphthalene (often more than 10% of the pure phase solubility of naphthalene)
  - PAHs (typically the highest PAH concentrations detected in the Platteville)
  - Sample results suggest the presence of a separate phase mixed product containing naphthalene and chlorinated solvents
  - These are Reilly Tar COCs
- At 6714 Walker St, shallow soil gas, soil and groundwater results indicate a PCE release
- Downgradient property boundary groundwater data show PCE/cisDCE impact above the regional lower drift/Platteville contamination
- This contaminant profile does not match that observed at W437, and therefore cannot be the source of the W437 contamination



RAMBOLL

DRAFTED BY: WZ | DATE: 11/26/2018

2007 Platteville Groundwater Data – Cis-1,2-Dichloroethene

St. Louis Park and Edina, Minnesota

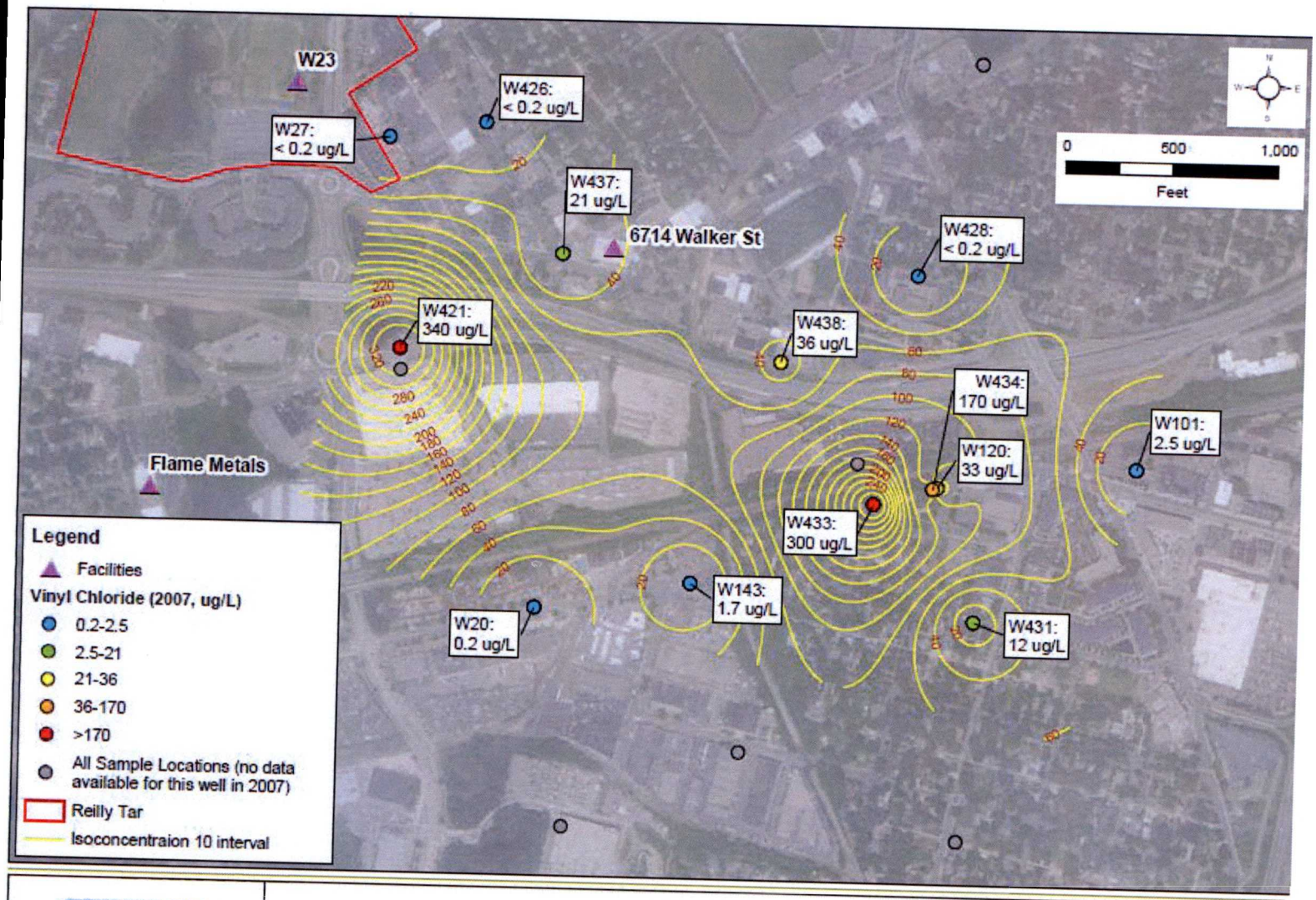
Figure X

PROJECT: 1690007575

Significant CVOCs at Platteville well W421 with no western boundary delineation

cis12DCE and vinyl chloride are the most commonly detected CVOCs in the Platteville

Source: MPCA database, contours generated in ArcGIS with IDW, contouring



RAMBOLL

DRAFTED BY: WZ | DATE: 11/26/2018

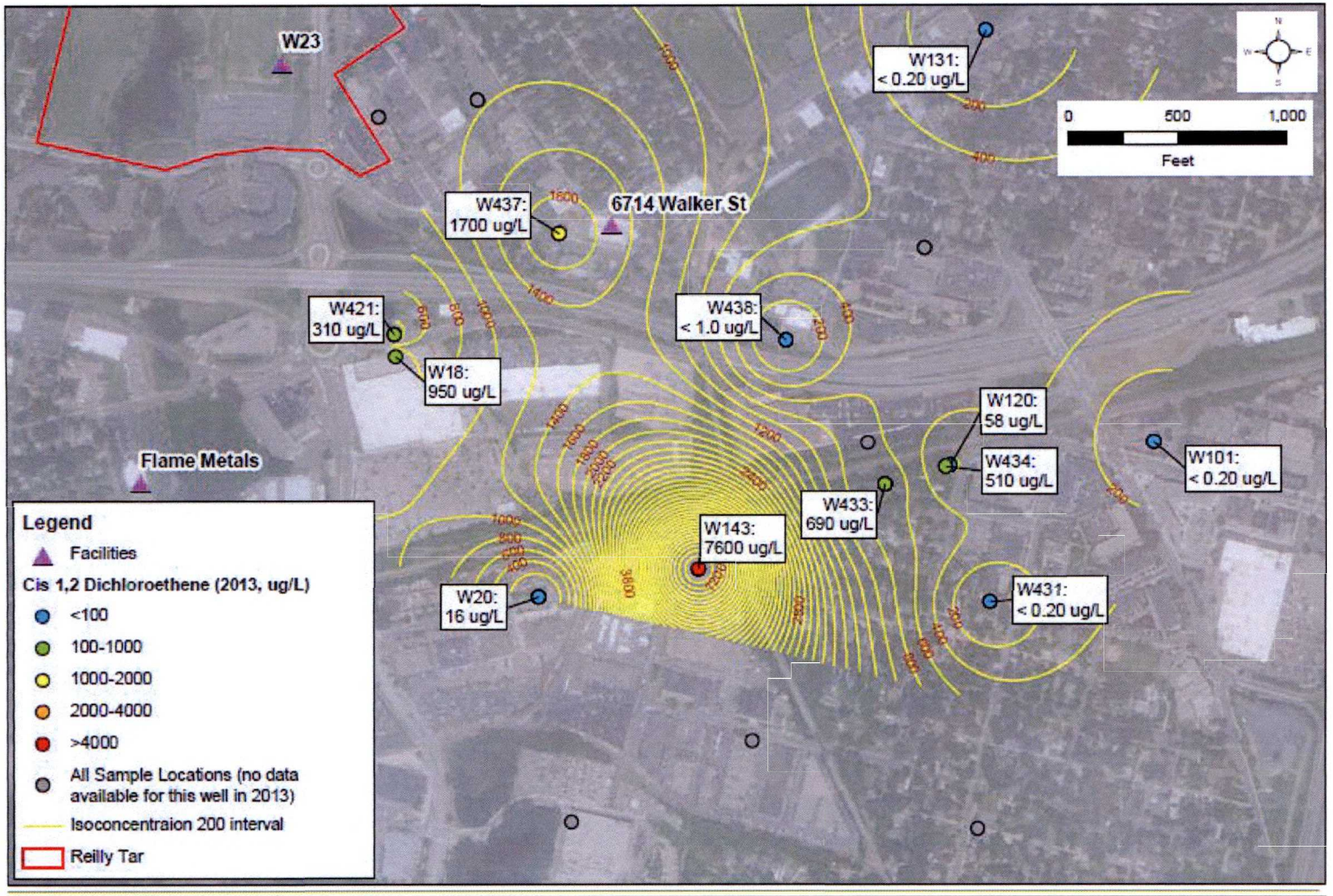
2007 Platteville Groundwater Data – Vinyl Chloride

St. Louis Park and Edina, Minnesota

Figure X

PROJECT: 1690007575

NOVEMBER 29, 2018



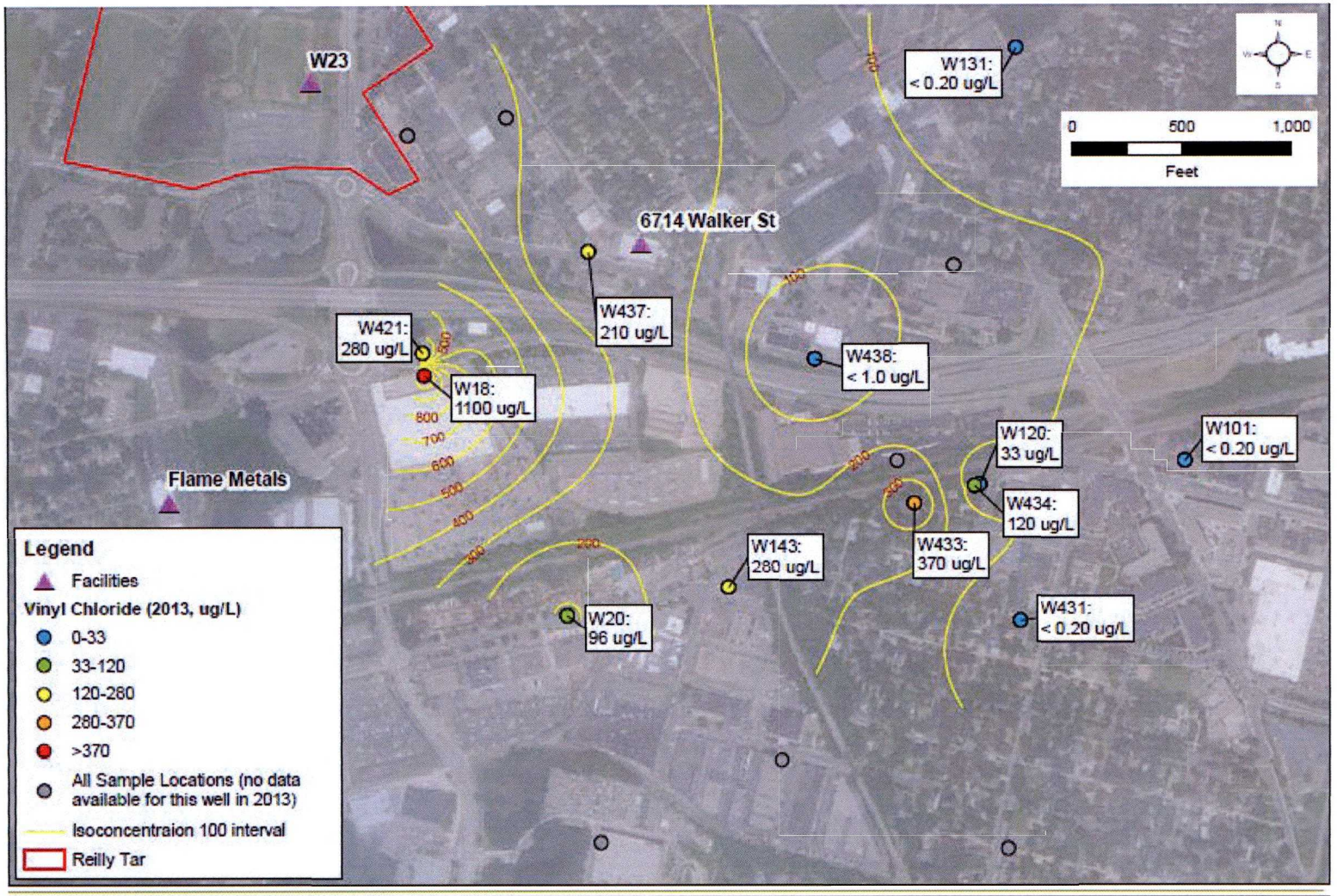
RAMBOLL

2013 Platteville Groundwater Data – Cis-1,2-Dichloroethene

St. Louis Park and Edina, Minnesota

Figure X

DRAFTED BY: WZ | DATE: 11/26/2018 | PROJECT: 1690007575



RAMBOLL

DRAFTED BY: WZ | DATE: 11/26/2018

2013 Platteville Groundwater Data – Vinyl Chloride

St. Louis Park and Edina, Minnesota

Figure X

PROJECT: 1690007575

PLATTEVILLE WELLS W421 AND W437

- W421 and W437 have similar chemistry
  - PAH, naphthalene, BTEX and chlorinated solvents
- Reilly Tar DNAPL was found in W421 (not analyzed for chlorinated solvents?)
- W437 also has PAH, naphthalene and chlorinated solvent concentrations consistent with free product

- A release of PCE at 6714 Walker St cannot explain the PAH and naphthalene concentrations in W437
- It is more likely that the PAH, naphthalene AND the chlorinated solvents in W437 originate from upgradient
- It is known that Reilly Tar DNAPL penetrated the drift and Platteville aquifers south and southeast of Reilly Tar. Based on Platteville well chemistry, it appears that this material contains chlorinated solvents as well

REILLY TAR WELLS W23 AND W105

W23 and W105 are multi-aquifer wells, according to USGS, and allowed contaminated groundwater to migrate to the Prairie du Chien and Ironton-Galesville units

MULTI-AQUIFER WELLS ARE KEY TO DEEP CONTAMINATION

IRONTON-GALESVILLE AND MOUNT SIMON-HINCKLEY AQUIFERS

The Ironton-Galesville and Mount Simon-Hinckley aquifers are overlain by several confining beds and aquifers (fig. 4). As with the Prairie du Chien-Jordan aquifer, contaminants can enter these aquifers through multiaquifer wells, but it is highly unlikely that contaminants have entered these aquifers in substantial amounts through natural paths (fig. 3).

USGS Open File Report 84-867 p. 44

MULTI-AQUIFER WELLS ARE KEY TO DEEP CONTAMINATION

Assessment of Ground-Water Contamination

The Prairie du Chien-Jordan aquifer is the region's major ground-water resource. About 75 percent of ground-water withdrawals in the St. Louis Park and Minneapolis-St. Paul Metropolitan Area are from this aquifer. The aquifer is relatively well protected from near-surface sources of contamination. In the St. Louis Park area, it is 250 to 500 feet below land surface and is overlain by drift, two bedrock confining beds (Glenwood and basal St. Peter), and two bedrock aquifers (Platteville and St. Peter). It is contaminated because coal-tar derivatives entered the aquifer through multiaquifer wells. The major single source of contamination in the aquifer is a well drilled on the site in 1917 (W23) that contained liquid coal-tar since at least 1958. The introduction, dissolution, and movement of this coal tar has caused contamination of nearby municipal wells.

USGS Open File Report 84-867 p. 44

MULTI-AQUIFER WELLS ARE KEY TO DEEP CONTAMINATION

The direction and rate of contaminant movement changes with time because the bedrock ground-water-flow system continually adjusts to hydraulic stresses caused by ground-water withdrawals and flow through multiaquifer wells. Contaminants can move rapidly through the Prairie du Chien-Jordan because the upper part of the aquifer is a carbonate rock having fracture and solution-channel permeability, low surface area for sorption, and low effective porosity. Consequently, the concentration and composition of contaminants in water pumped from individual industrial and municipal wells completed in the aquifer fluctuates with time. Although contaminants have been in the aquifer for at least 50 years, and the present distribution of contaminants is complex, the concentrations remain highest near the points of introduction through multiaquifer wells near and on the site of the former plant.

USGS Open File Report 84-867 p. 44

W105 – SUGAR BEET WELL (1899) 940 FOOT DEEP MULTI-AQUIFER WELL ON OLD REILLY TAR SITE

Detected Contaminants						Well Name:	W105	W105	W105
						CWI Name:			
						MN Unique Well No.:	00200979	00200979	00200979
						Aquifer:	Ironton-Galesville	Ironton-Galesville	Ironton-Galesville
						STS/AECOM Sample ID:			
						MDH Sample No:	200610289	200811240	200904989
						Sample Date:	05/01/06	05/05/08	05/05/09
						Notes:	PAH Split Sample	PAH Split Sample	PAH Split Sample
Detected Contaminants		MN Drinking Water Standard		Federal Drinking Water Standards					
Benzene	ug/L	2	HRL	5	MCL		0.8	1.2	57 RC
Bromodichloromethane	ug/L	6	HRL	--			<0.2	<0.2	<0.2
n-Butylbenzene	ug/L	--		--			<0.5	<0.5	<0.5
Chlorodibromoethane	ug/L	--		--			<0.5	<0.5	<0.5
Chloroethane	ug/L	--		--			<0.5	<0.5	<0.5
Chloroform	ug/L	30	HRL	--			<0.1	<0.1	<0.1
1,1-Dichloroethane	ug/L	--		--			<0.2	0.8	<0.2
1,2-Dichloroethane	ug/L	4	HRL	5	MCL		<0.2	0.2	<0.2
1,1-Dichloroethene	ug/L	200	HRL	7	MCL		<0.2	0.3 J	<0.2
cis-1,2-Dichloroethene (DCE)	ug/L	50	HRL	70	MCL		0.3	35	100 RC
trans-1,2-Dichloroethene	ug/L	100	HRL	100	MCL		<0.1	1.6	36
Dichlorodifluoromethane	ug/L	700	HBV	--			<0.1	1.4	4.4 QR
Dichlorofluoromethane	ug/L	--		--			<0.5	<0.5	<0.5
Ethylbenzene	ug/L	50	HBV	700	MCL		1.1	<0.5	75 RC
Isopropylbenzene	ug/L	300	HRL*	--			<0.5	<0.5	9.3
p-Isopropyltoluene	ug/L	--		--			<0.5	<0.5	1.6
Methylene chloride (Dichloromethane)	ug/L	5	HRL	5	MCL		<0.5	<0.5	<0.5
Naphthalene	ug/L	300	HRL	--			7.1	<1.0	2700 RC
n-Propylbenzene	ug/L	--		--			<0.5	<0.5	2.7
Styrene	ug/L	--		100	MCL		<0.5	<0.5	<0.5
Tetrachloroethene (PCE)	ug/L	5	HRL	5	MCL		<0.2	<0.2	<0.2
Tetrahydrofuran	ug/L	--		--			<10	<10	<10
Toluene	ug/L	200	HBV	1000	MCL		1.5	<0.5	2.3
1,1,1-Trichloroethane	ug/L	9000	HRL	200	MCL		<0.2	<0.2	<0.2
Trichloroethene (TCE)**	ug/L	0.4	HRL	5	MCL		<0.1	0.8	0.3
1,2,4-Trimethylbenzene	ug/L	--		--			0.9	<0.5	36 RC
1,3,5-Trimethylbenzene	ug/L	100		--			0.4 J	<0.5	10
Vinyl Chloride **	ug/L	0.2	HRL	2	MCL		<0.2	6.6	92 RC
o-Xylene	ug/L	300	HRL	--			0.5	<0.2	46 RC
p&m-Xylene	ug/L	300	HRL	--			1.1	<0.3	73 RC
Xylene (total)	ug/L	300	HRL	10000	MCL		1.6	<0.5	119 RC

W105 had the highest reported vinyl chloride concentration in the Prairie du Chien or deeper aquifers at 92 ppb, nearly 50 times the MCL

From MPCA 2015 Preliminary Assessment Report

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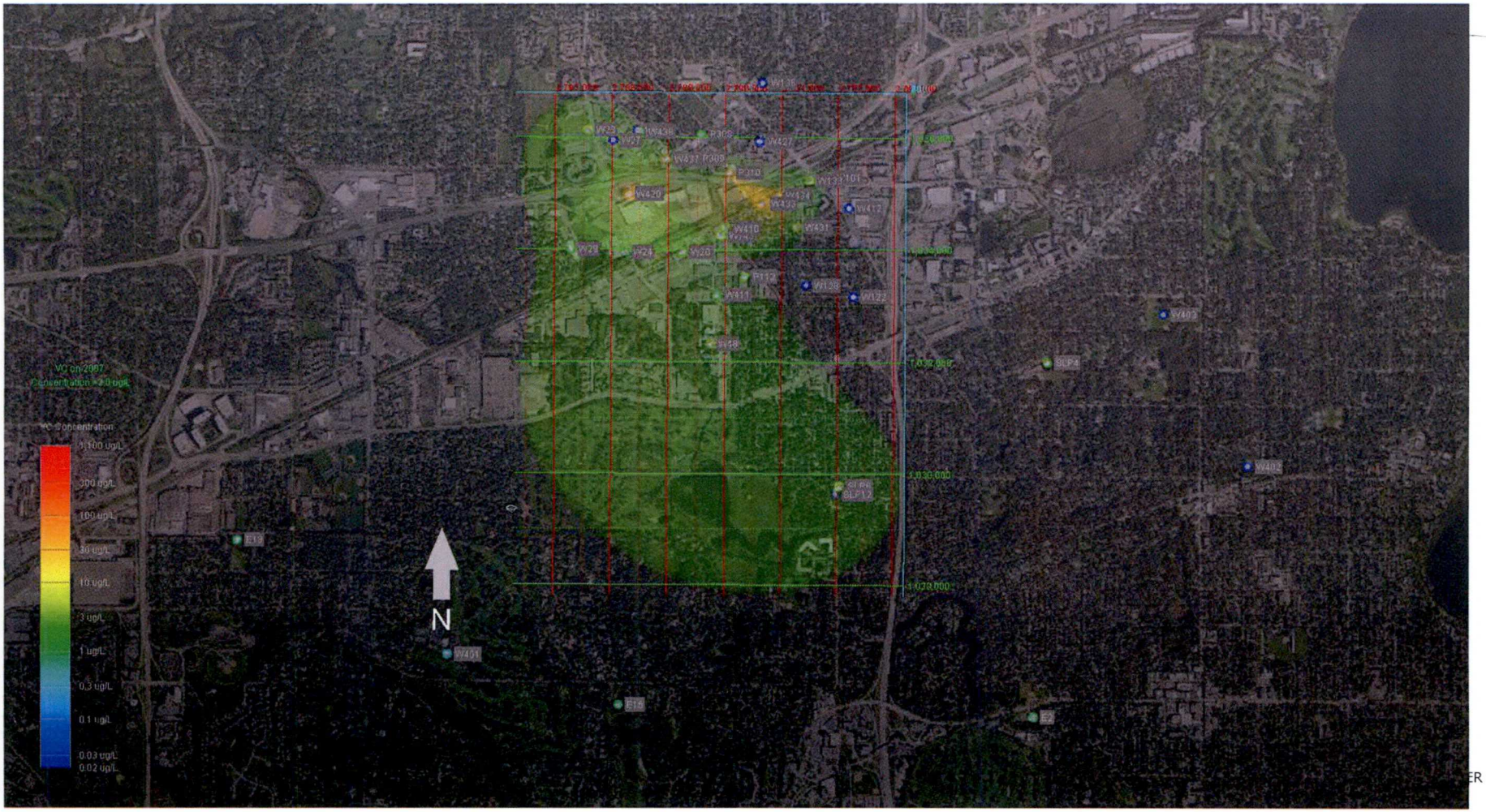
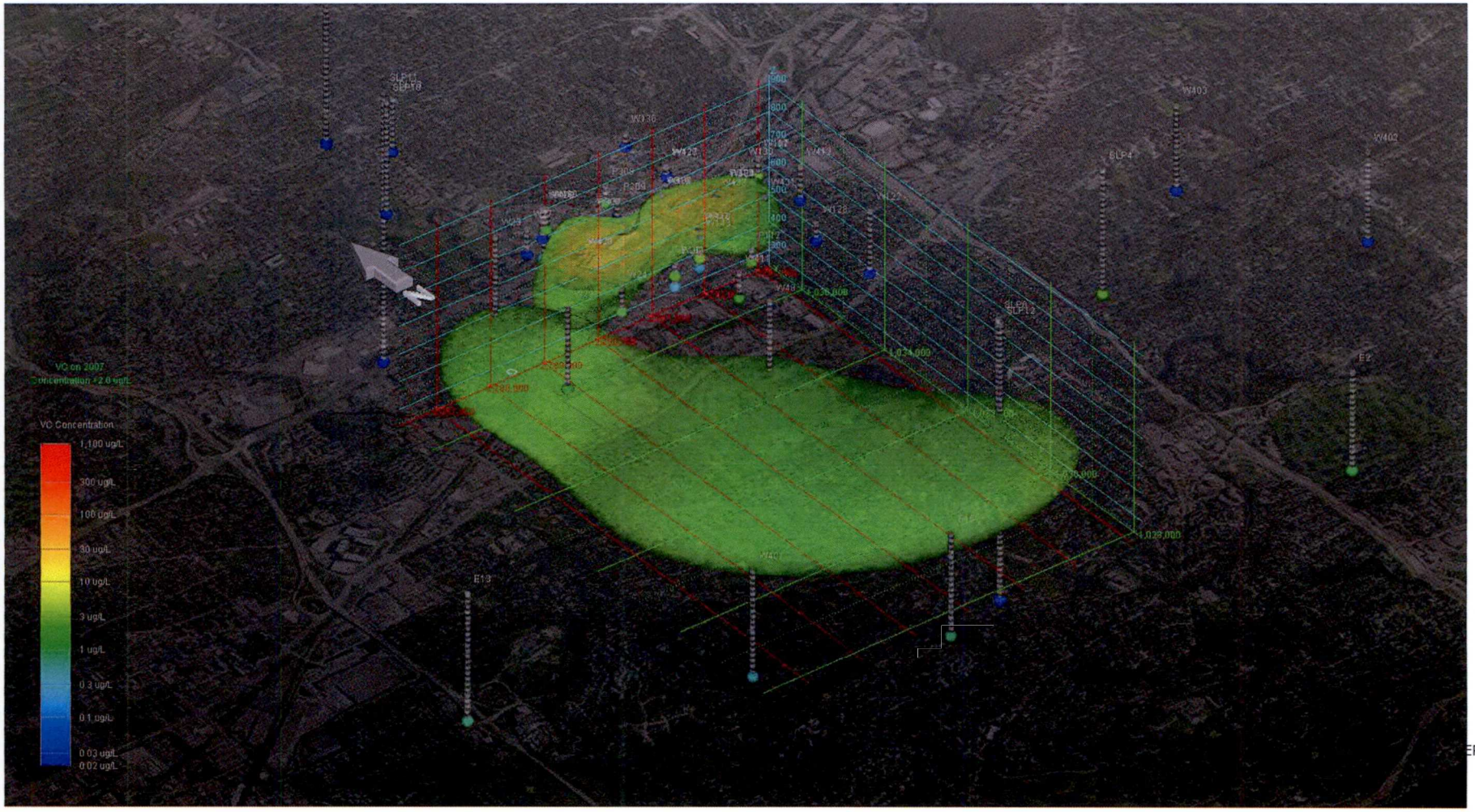
3D IMAGES OF GROUNDWATER PLUME FROM MPCA DATABASE

- Environmental Visualization Systems software (C Tech Development) was used to krig and visualize groundwater data from the site
- Used unaltered database received from MPCA

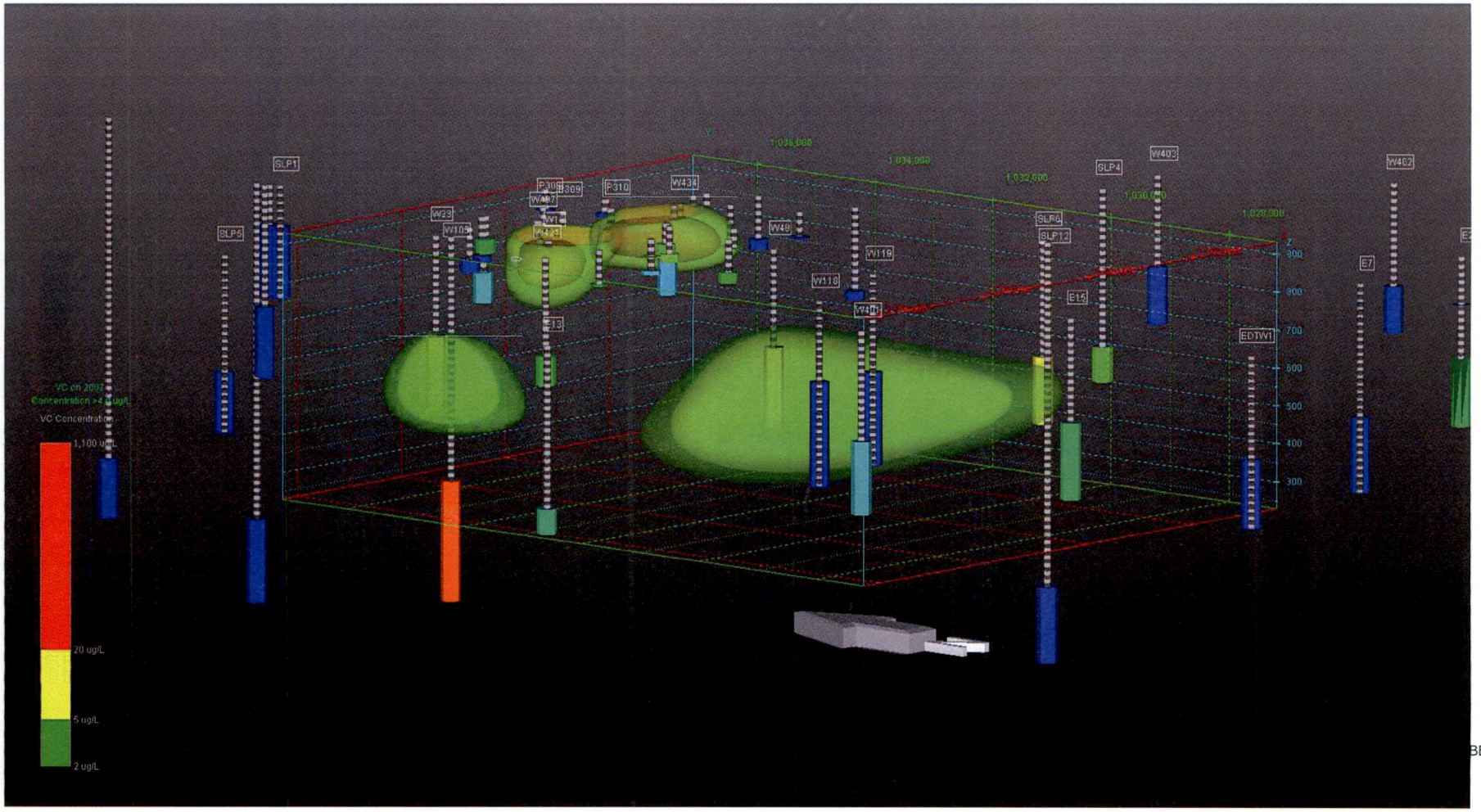
2007 VC DATA LOWEST ISOLEVEL = 2 UG/L



2007 VC DATA – OBLIQUE VIEW FROM SOUTHWEST – 2 UG/L

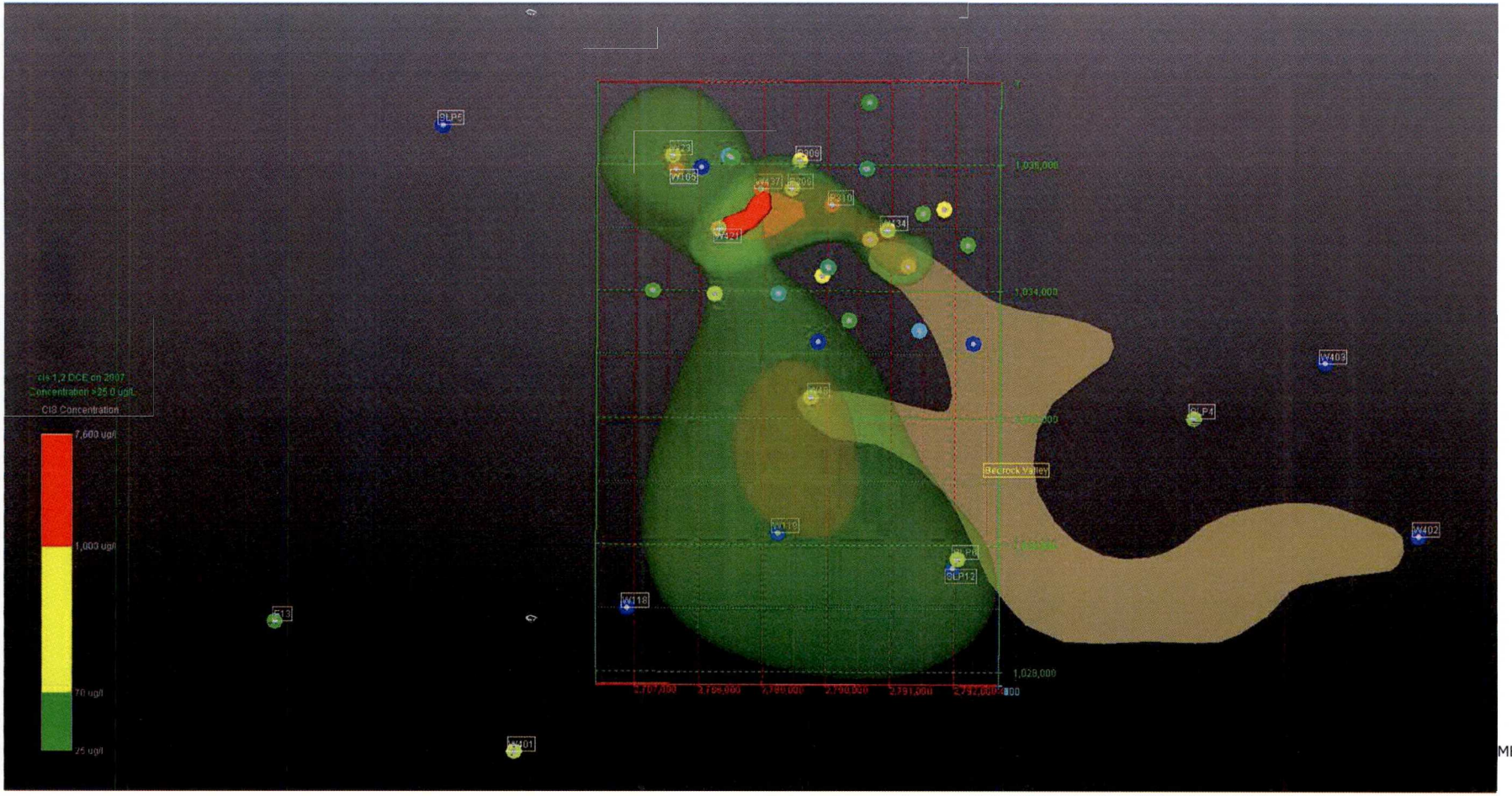


VINYL CHLORIDE 2007 – OBLIQUE VIEW FROM SW – 4 UG/L

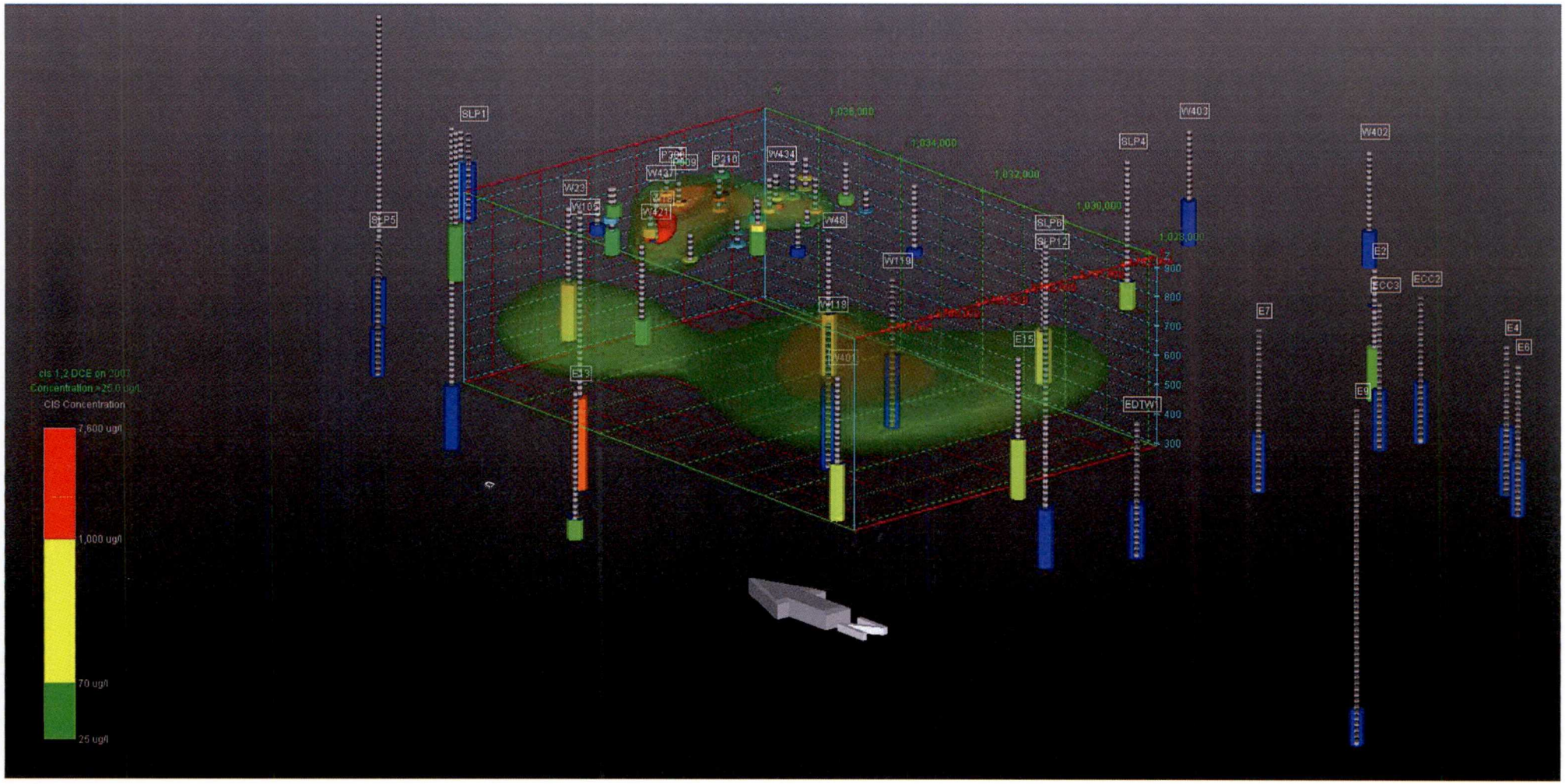


CIS 2007 DATA – MINIMUM ISOLEVEL = 2 UG/L

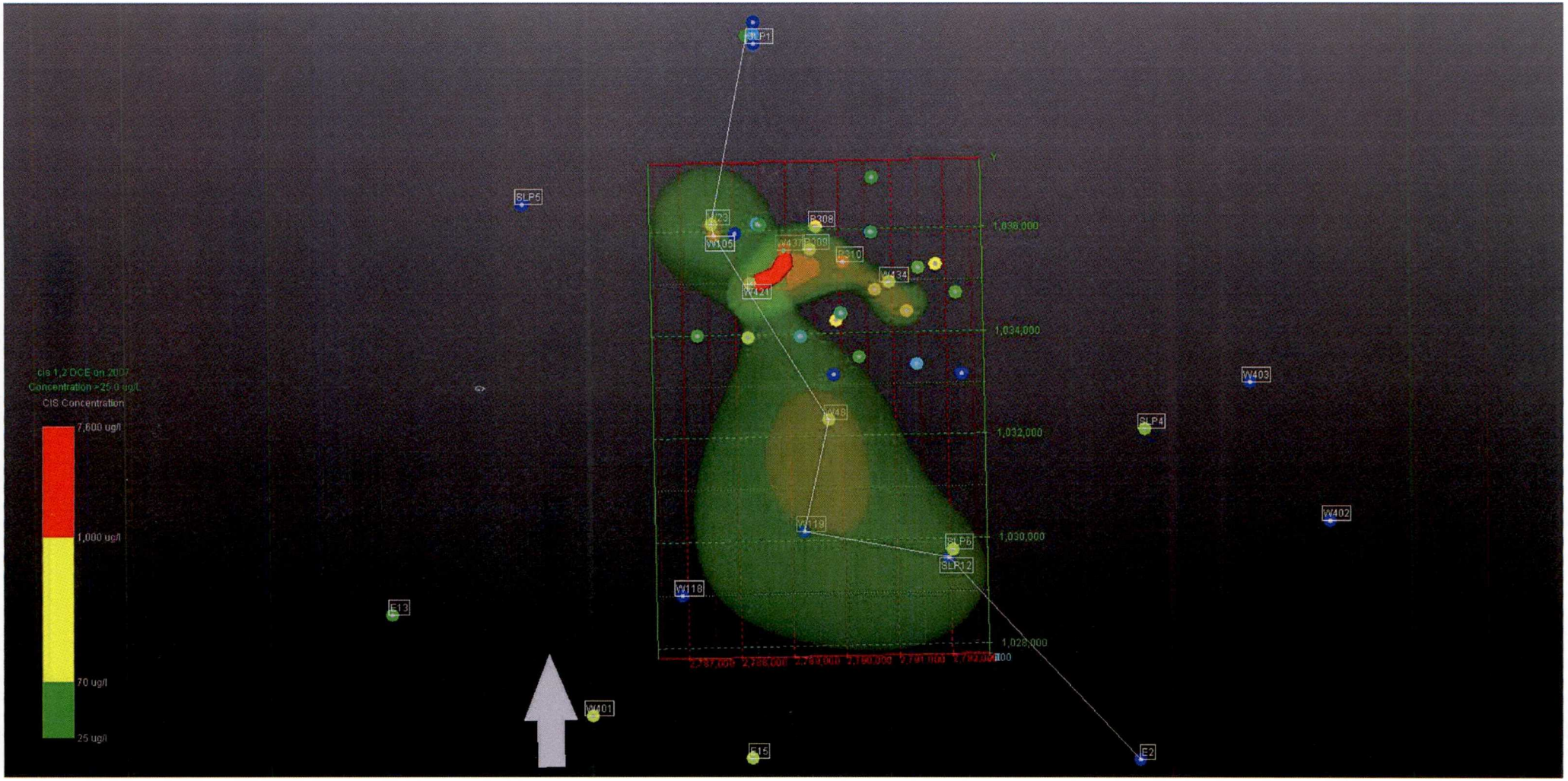
CIS 2007 – MINIMUM ISOLEVEL 25 UG/L



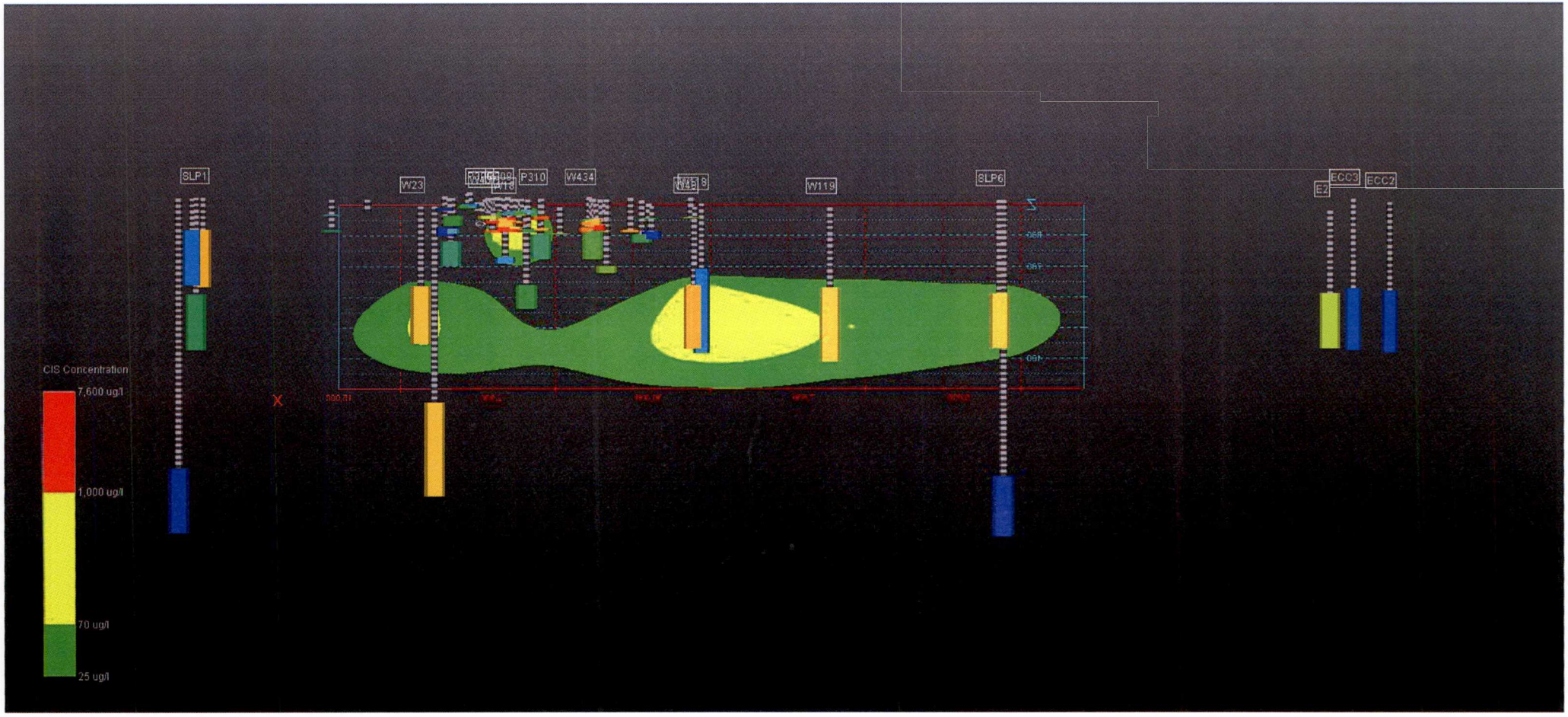
CIS 2007 OBLIQUE VIEW FROM SW – 25 UG/L



CIS 2007 - CROSS SECTION LINE FOR NEXT SLIDE



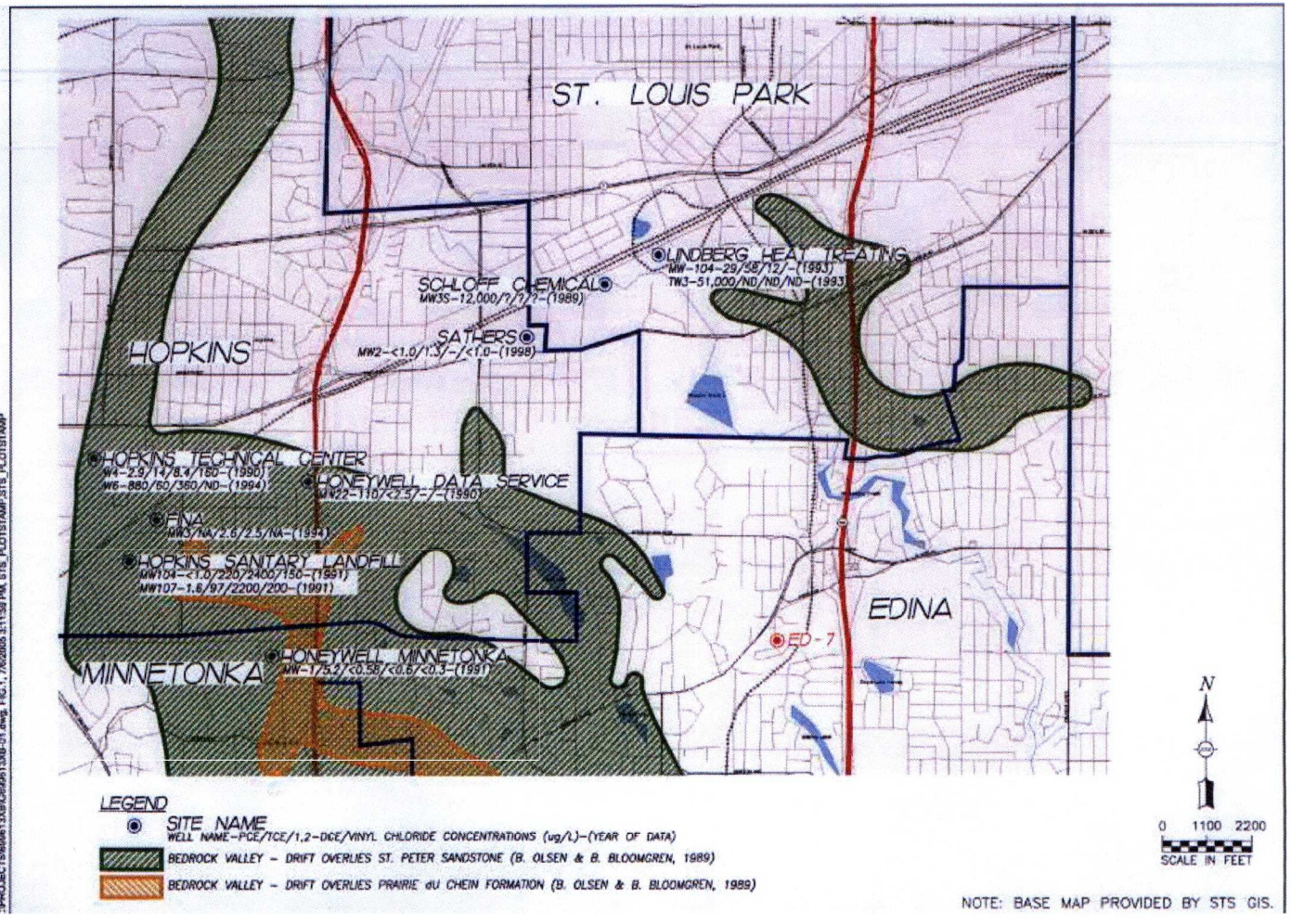
CIS 2007 CROSS SECTION – 25 UG/L



CONCLUSIONS FROM DATA PLOTTING AND ANALYSIS

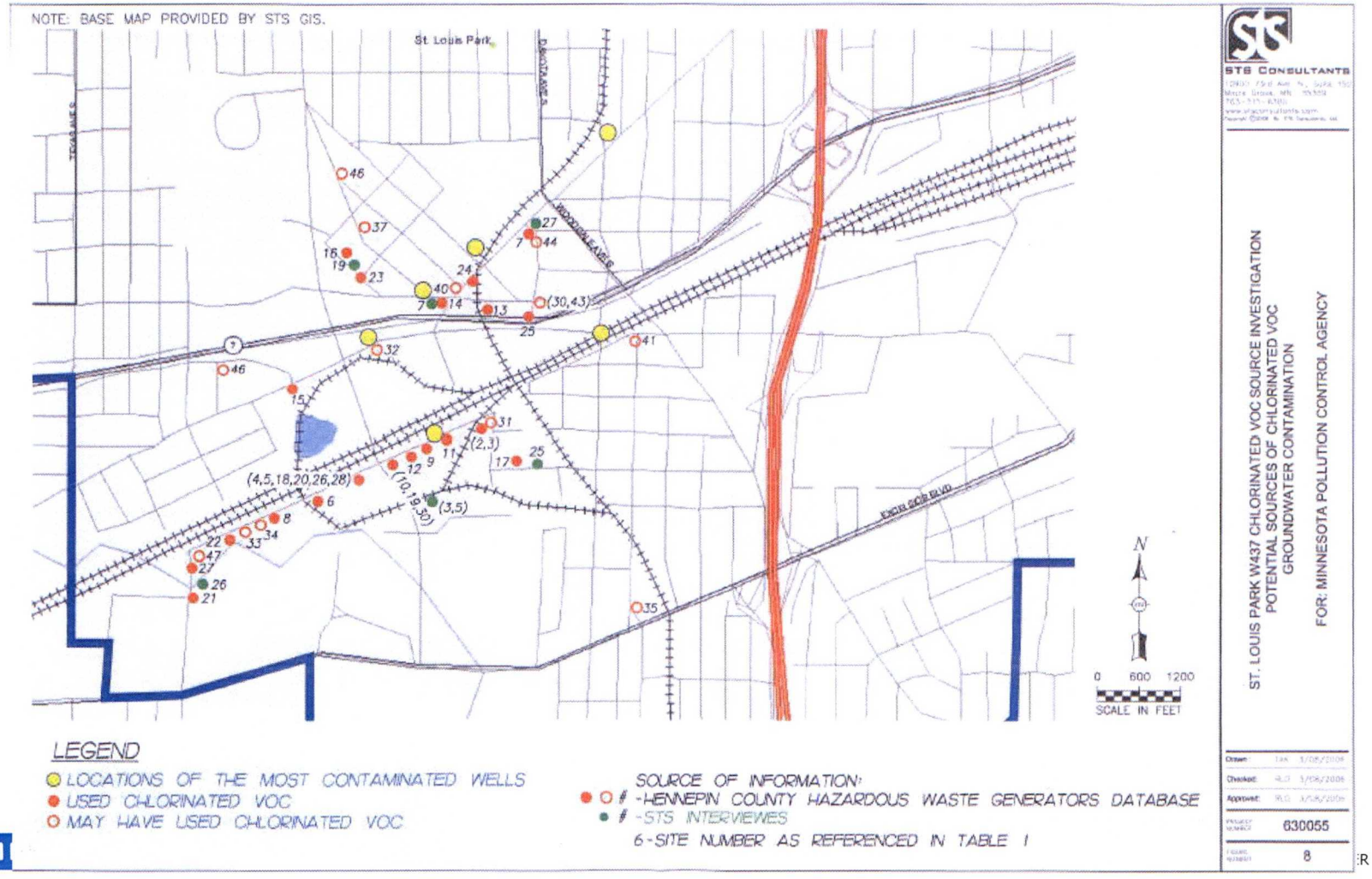
- Data are consistent with chlorinated solvent introduction into the deeper aquifers (Prairie du Chien and Ironton-Galesville) via W23 and possibly W105 at Reilly Tar – upgradient from 6714 Walker St
- High concentrations of CVOCs are detected in W23 and W105
- The data are also consistent with mixed coal tar and CVOC product penetrating the drift and Platteville aquifers south and southeast of Reilly Tar
- This shallow drift and Platteville groundwater contamination appears to be migrating to the southeast, separate from the deeper Prairie du Chien contamination
- The bedrock valley does not appear to be a significant migration pathway for contaminants to the Prairie du Chien
- Data do not show a vertical migration pathway from drift aquifer PCE contamination at 6714 Walker St to the Prairie du Chien through the St Peter

ADDITIONAL SOURCES OF CVOCS



From STS Edina Well 7 Investigation Phase II Report, June 2005

From City of Edina Well No. 7 Study – Phase III Report, STS 2006



From STS St Louis ParkW437 Source Investigation Report, 2006

SOURCES OF CVOCS – VINYL CHLORIDE AND 1,4-DIOXANE

- Dozens of potential sources of CVOCs were identified in the early investigation in Hopkins and St. Louis Park
  - Tool and die shops, metal and heat treating, electronics equipment, landfills
- Many known sources of chlorinated ethenes:
  - Schloff Chemical, Lindberg Heat Treating, Flame Metals, Eclipse Electric, Hopkins Sanitary Landfill, Hopkins Technical Center
- One known source of chlorinated ethanes (e.g., 1,1,1-TCA):
- Control Data Corporation
  - Release of 1,1,1-trichloroethane
  - 1,4-dioxane was often present in this solvent (but not in PCE or TCE)
  - Vertical migration through additional multi-aquifer wells could explain 1,4-dioxane in SLP4/6
- The highest concentrations of 1,1-dichloroethane in the PDC were in W401 (west of E7)
  - If E7 does not yet require treatment for 1,4-dioxane, it may in the future

CONCLUSION

- MPCA has not demonstrated any connection between 6714 Walker St and vinyl chloride in Edina well 7
- The lack of significant contamination in the St. Peter suggests multi-aquifer wells, rather than natural vertical migration caused contamination in the Prairie du Chien
- Reilly Tar via its multi-aquifer wells appears to be the primary source of vinyl chloride and cisDCE in the Prairie du Chien
- There are numerous additional sources of CVOCs to the drift aquifer
  - Unknown if these also impact the PDC
  - Other multi-aquifer wells are likely
- The PCE plume from 6714 Walker St appears to be limited to the drift
- Groundwater models are unable to show a flow pathway from 6714 Walker to E7
- The primary source of the 1,4-dioxane has not been demonstrated, although one significant source has been identified
- 6714 Walker St is not a source of 1,4-dioxane

REFERENCES

1. MPCA web page for the St. Louis Solvent Site https://www.pca.state.mn.us/waste/st-louis-park-solvent-plume-and-vapor-intrusion-site (slide 4)
2. MPCA (2017) Site Inspection Report for St. Louis Park Solvent Plume (slides 5-8)
3. MPCA (2015) Preliminary Site Assessment Report for St. Louis Park Solvent Plume (slides 9, 10, 15, 20, 25)
4. Reilly Tar & Chemical Corp Five Year Review Reports (slides 10, 11, 15, 20)
    1. First – MPCA (1996)
    2. Second – MPCA (2001)
    3. Third – MPCA (2006)
    4. Fourth – MPCA (2011)
    5. Fifth – EPA and MPCA (2016)
5. STS (2006) Reilly Tar/Meadowbrook Ground Water Model Expansion Report (slide 12)
6. City of St. Louis Park (1989, 1995, 1998, 2003, and 2011) Annual Monitoring Reports for Reilly Tar & Chemical Corp NPL Site (slides 10, 11, 15, 20)

REFERENCES (CONT'D)

7. GHD (2018) Source Area Investigation Report for 6714 Walker St (slides 13, 14)

8. MPCA Electronic Database provided in response to FOIA request (slides 16-19, 27-35)

9. USGS (1984) Assessment of Ground-Water Contaminated by Coal-Tar Derivatives, St. Louis Park Area, Minnesota, Open File Report 84-867 (slides 20, 22-24)

10. USGS (1994) Hydrogeology and Ground-Water Flow in the Drift and Platteville Aquifer System, St. Louis Park, Minnesota, Water Research Investigation Report 94-4204

11. STS (2005) Edina Well No. 7 Investigation Phase II Report (slide 36)

12. STS (2006) Edina Well No. 7 Study – Phase III Report (slide 37)

13. STS (2006) St. Louis Park W437 Source Investigation Report (slide 38)

14. Delta Environmental (1990) Remedial Investigation Report for Schloff Chemical Site (slide 39)

15. Barr Engineering (1992) Remedial Investigation Report for Schloff Chemical Site (slide 39)

REFERENCES CONT'D

16. Braun Intertec (2011) Phase I ESA for Control Data Corporation Site (slide 39)

17. Rust Environment & Infrastructure (1994) Trichloroethylene Release Remedial Investigation and Corrective Action Report. (slide 39)

THANK YOU

RAMBØLL